

Geant 4

Short Course

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IEEE NSS/MIC 2004

Roma, 17 October 2004

<http://www.ge.infn.it/geant4/events/nss2004/geant4course.html>

<http://cern.ch/geant4>

Outline of the course: morning, part 1

- **Introduction - *K. Amako***
 - Brief overview of basic concepts in the simulation of particle interactions with matter
 - Geant4 vision: scope, fundamental concepts
- **Basic structure of the Geant4 Simulation Toolkit - *D. Wright***
 - Geant4 architecture
 - System of units
 - Geant4 kernel (Run, Event, Tracking)
- **Detector modeling - *G. Cosmo***
 - Materials
 - Basic Geometry
 - Advanced Geometry
 - Read-out and detector response

Tea break

Outline of the course: morning, part 2

- **Primary event generation and interactions of particle with matter - *D. Wright, A. Heikkinen, M.G. Pia***
 - Primary particle generation (D.W.)
 - Particles and physics processes (MGP)
 - Electromagnetic physics: standard, low-energy, optical processes (MGP)
 - Hadronic physics

Lunch

Outline of the course: afternoon, part 1

- **Interactive capabilities – *D. Wright***
 - Visualisation
 - User interface
 - Associated data analysis
- **Overview of other Geant4 capabilities - *G. Daquino***
 - Event biasing
 - Parameterisation (fast simulation)
 - Persistency
 - Parallelisation and integration in a distributed computing environment
- **Overview of Geant4 application in diverse domains - *M. G. Pia***
 - High energy and nuclear physics experiments
 - Astroparticle physics and astrophysics
 - Space science
- **Geant4 for medical applications - *S. Guatelli***
 - Geant4 capabilities relevant to medical applications
 - Geant4 in radiotherapy: dosimetry with external beams, IMRT, brachytherapy, hadrontherapy
 - Geant4 in nuclear medicine: PET, PEM

Tea break

Outline of the course: afternoon, part 2

- **How to use Geant4 - *S. Guatelli***
 - Design of a basic user application
 - User initialisation and actions
- **An application example: dosimetry with Geant4 - *S. Guatelli***
 - Design overview
 - Code overview
 - Demo
- **Installation - *G. Cosmo***
 - Geant4 installation, supported platforms
- **How to learn more - *K. Amako***
 - Documentation
 - User support
- **Discussion**

Course material

- All course material can be downloaded from <http://www.ge.infn.it/geant4/events/nss2004/geant4course.html>
- Geant4 User Documentation and further training material can be found at Geant4 web site: <http://cern.ch/geant4>
- After this course, you may profit of Geant4 user support, provided by the Geant4 Collaboration
 - including a User Forum accessible through HyperNews (link from Geant4 home page)

Geant4 Training and User Support

- This course is part of the training programme offered by the Geant4 Collaboration
 - an international collaboration of scientists, developing and maintaining the Geant4 Simulation Toolkit
- This course is a brief introduction to the architecture, modeling capabilities, physics, functionality and applications of the Geant4 Toolkit
 - it does not replace the study of Geant4 User Documentation
- More extensive courses, with hands-on exercises, are organized by the Geant4 Collaboration
 - information available from Geant4 web site <http://cern.ch/geant4>